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Ovine trypanosomosis : a seroepidemiological survey in coastal Guyana

VOKATY (S.), McPHERSON (V.O.M.), CAMUS (E.), APPLEWHAITE (L). La trypanosomose ovine : une prospection séro-épidémiologique dans la zone côtière du Guyana. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 57-59

Le but de cette étude était de déterminer les taux de séroprévalence de *Trypanosoma vivax* et de *Trypanosoma evansi* chez des moutons de la zone côtière du Guyana. Des prélèvements de sang ont été faits sur 193 moutons, pris au hasard, dans 22 fermes de la Région 5, Mahaica/Berbice, une région côtière du Guyana. L'âge, la race, le sexe et la ferme d'origine ont été enregistrés pour tous les moutons prélevés. Cent soixante-seize prélèvements de sérum ont été examinés par le test d'immunofluorescence indirecte pour *T.vivax* et *T.evansi*. La fluorescence a été notée comme 0 (négative), 1+ (très faible), 2+ (faible), 3+ (forte) ou 4+ (très forte), sur des sérums dilués à 1:160. Les échantillons ont été considérés comme positifs dès qu'une fluorescence était visible. Les résultats des tests ont été reçus pour 161 prélèvements. Cent trois sérums (64 %) étaient positifs ; 38 (23,6 %) d'entre eux étaient positifs pour *T.evansi* seulement, 11 (6,8 %) pour *T.vivax* seulement, et 54 (33,5 %) pour les deux. Étant donné qu'il existe des réactions croisées entre *T.vivax* et *T.evansi*, il était difficile de déterminer l'espèce responsable pour les réactions positives pour les deux espèces. Le taux global de séroprévalence de 64 % suggère que la trypanosomose est endémique chez les ovins de la côte guyanaise. Ces résultats constituent la première preuve sérologique de *T.evansi* au Guyana. Tandis que *T.vivax* est considéré comme pathogène pour le mouton, l'importance clinique de *T.evansi* reste inconnue. Le vecteur de ces deux espèces de trypanosomes pour les moutons de la côte septentrionale de l'Amérique du Sud n'est pas connu non plus.

Mots clés : Ovin - Trypanosomose - *Trypanosoma evansi* -*Trypanosoma vivax* - Epidémiologie - Sérum - Immunofluorescence indirecte - Prévalence - Guyana.

INTRODUCTION

The trypanosomes, *Trypanosoma vivax* and *Trypanosoma evansi* , are vector-transmitted hemoparasites commonly found in livestock in Africa and Latin America. *Trypanosoma vivax* is found in cattle, sheep, goats and wild ruminants in Africa, where it is spread by the tsetse fly, *Glossina* sp. It causes Nagana in African cattle and sheep, a disease complex characterized by fever, anaemia, reduced fertility, weight loss and mortality (3, 12). In the New World, *T. vivax* infection has been recorded in cattle, buffalo, sheep and goats (15). The tsetse fly is not found in the Americas. Infection is probably mechanically transmitted by biting flies. Three species of Tabanids have been proven to be experimental vectors of *T. vivax* infection of cattle in South America, *Cryptotylus unicolor* (8), *Tabanus importunus* (14) and *Tabanus nebulosus* (13). However, the experimental transmission of trypanosomes by biting insects does not necessarily imply that they play a significant role in the field (9). Suggested reservoirs of *T. vivax* in the New World include cattle and deer (15).

Trypanosoma evansi is found in the Middle East, Asia, the Far East, Central and South America and Africa. It has clinical significance in horses, donkeys, camels, buffaloes, cattle and dogs, causing a disease called surra (12). This disease is characterized by intermittent fever, anaemia, dependent oedema, lethargy, loss of condition, nervous signs and eventually death (11). Natural infection has been found in several species of wild animals including the capybara (*Hydrochoerus capybara*), a large rodent found in South America, which has been suggested to be the reservoir (16). Cattle and buffalo in endemic areas can be subclinically infected and may act as reservoirs for other animals (15). In Africa and Asia, the incidence of surra is associated with wet seasonal conditions which increase the population of biting flies, resulting in "surra seasons" (15). The vector in Central and South America has been postulated to be biting flies (4) or the vampire bat, *Desmodus rotundus* (10).

In March 1992, a baseline survey of ovine health on small farms was conducted in Region 5, Mahaica/Berbice, a coastal area of Guyana. The objectives of this study were to evaluate the presence, significance and frequency of selected diseases in target sheep flocks in order to develop appropriate, effective and economical preventive medicine recommendations. As part of this survey, serological testing was done for *Trypanosoma evansi* and *Trypanosoma vivax*.

MATERIALS AND METHODS

In March 1992, demographic data and blood samples were collected from a systematic random sample of sheep on twenty-two farms. Sheep were categorized as ewe, nursing lamb, weaned lamb or ram. Farm of origin,

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sex, approximate age, breed and body condition scores were recorded. Blood samples were collected by jugular venipuncture from 163 sheep. Blood samples were centrifuged, serum was pipetted and frozen until laboratory submission.

Serum samples were subjected to Indirect Fluorescent Antibody (IFA) testing for *Trypanosoma vivax* and *Trypanosoma evansi*, using the following technique. Antigen slides were made using *T. vivax* from an experimentally infected goat and *T. evansi* from infected mice. The smears were air dried at room temperature, fixed in acetone and stored at -20°C. Smears were thawed at room temperature for 15 min, then divided into 3 rows of 7 wells with permanent marker. The test sera, diluted to 1:160 concentration, were incubated for 30 min in humid chambers at 37°C, washed for 10 min in a PBS bath, then incubated with conjugated goat anti-ovine IgG L+H and Evans blue. Slides were then covered with Indirect Fluorescent buffer mountant, air-dried and examined under a 10x eyepiece with 50x objective on a fluorescent microscope. Fluorescence was graded as 0 (negative), 1+ (very weak), 2+ (weak), 3+ (strong) or 4+ (very strong). Samples were considered to be seropositive if any fluorescence was observed (>0).

RESULTS

Age at time of sampling varied between 3 months and 7 years of age, with a mean of 2.2 years. One hundred and eleven (69 %) were female and fifty (31 %) were male. Most (90 %) sheep were Creole or mixed breed, with the rest considered to be mainly of Barbados Blackbelly type. Mean recorded body condition score was 3; however, these data were considered unreliable as the scoring method was not sufficiently standardized between scorers.

Trypanosoma serology results were received for one hundred and sixty-one (161) samples. One hundred and three (64 %) sera were sero-positive for *Trypanosoma* sp. on Indirect Fluorescent Antibody test. Of these, 38 (23.6 %) sera were positive to *T. evansi* only, eleven (6.8 %) were positive to *T. vivax* only and 54 (33.5 %) were positive for both. Of 43 samples from lambs under 1 year of age, 29 (67 %) were positive to *Trypanosoma* sp. The youngest seropositive lamb was 3 months old.

DISCUSSION

The overall seroprevalence rate of 64 % for *Trypanosoma* sp. suggests that trypanosomosis is endemic in sheep in coastal Guyana. As cross reactions occur between *T. vivax* and *T. evansi*, it was difficult to determine the true species of exposure for the sera which tested positive to both species. This seroprevalence result corroborates the finding of APPLEWHAITE, who found a seroprevalence rate of 63.4 % of *T. vivax* in sheep in Guyana using an ELISA (Enzyme Linked Immuno Sorbent Assay) procedure. The same study found trypanosome infection in 4.6 % of sampled sheep, based on examination of stained thick blood films (2). In a survey of cattle in Guyana in 1975, CRAIG found 5 samples out of 1019 (0.6 %) to be positive for *T. vivax*, using examination of stained thick blood films. All infected cattle were from coastal regions (6).

The pathogenicity of New World *T. vivax* is variable but tends to be lower than of African strains (15). Studies in cattle, sheep and goats have demonstrated that *T. vivax* infections may be acute, subacute or chronic (1). Trypanosome susceptibility varies between ruminant species, between breeds and between individuals within a breed (6). Asymptomatic infections and mixed infections with *Babesia* and *Anaplasma* are common. In symptomatic domestic ruminants, clinical signs include intermittent fever, anaemia and loss of condition (15). Bovine trypanosomosis has been associated with clinical disease, abortion and high mortality in Colombia (17) and Venezuela (5). Recent evidence in French Guiana has associated ovine *T. vivax* infection with abortion and mortality (7). In sheep in Africa, hair loss from the back, tail and scrotum and peripheral lymphadenopathy have also been associated with *T. vivax* infection (6). Control measures for *T. vivax* in Africa include the use of insecticides, trypanocides and tsetse fly trapping. Research is currently underway in Africa in the areas of vaccine development and breeding trypanosome resistant cattle and sheep (12).

This was the first serological evidence of *T. evansi* in sheep in Guyana. Strains of *T. evansi* from different geographic areas vary greatly in virulence and economic importance for domestic animals (15). The clinical significance and economic importance of *T. evansi* infection in sheep in South America are not clearly understood.

CONCLUSION

Further studies are necessary to evaluate the clinical significance and economic impact of *T. vivax* and *T. evansi* infection in sheep in Guyana. If these studies determine trypanosomosis to be an important constraint to productivity, research to identify the vectors and reservoirs in Guyana would be justified.

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VOKATY (S.), McPHERSON (V.O.M.), CAMUS (E.), APPLEWHAITE (L). Ovine trypanosomosis : a seroepidemiological survey in coastal Guyana. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 57-59

The objective of this study was to determine the seroprevalence rates of *Trypanosoma vivax* and *Trypanosoma evansi* in sheep in coastal Guyana. Blood samples were taken from a systematic random sample of one hundred and ninety-three (193) sheep on twenty-two (22) farms in Region 5, Mahaica/Berbice, a coastal area of Guyana. Age, breed, sex, and farm of origin were recorded for all sampled sheep. One hundred and seventy-six (176) serum samples were submitted for Indirect Fluorescent Antibody (IFA) testing for *T. vivax* and *T. evansi*. Fluorescence was graded as 0 (negative), 1+(very weak), 2+(weak), 3+(strong) or 4+(very strong), measured at 1:160 dilution of serum. Samples were considered to be sero-positive if any fluorescence was observed. Indirect Fluorescent Antibody results were received for one hundred and sixty-one (161) samples. One hundred and three (64 %) sera were sero-positive for *Trypanosoma* sp. Of these, 38 (23.6 %) sera were positive to *T. evansi* only, 11 (6.8 %) were positive to *T. vivax* only and 54 (33.5 %) were positive for both. As cross reactions occur between *T. vivax* and *T. evansi*, it was difficult to determine the true species of exposure for the sera which tested positive to both species. The overall sero-prevalence rate of 64 % suggests that trypanosomosis is endemic in sheep in coastal Guyana. This was the first serological evidence of *T. evansi* in Guyana. Although *T. vivax* is believed to be pathogenic in sheep, the clinical significance of *T. evansi* remains unknown. The vector of both species of trypanosomes in sheep on the north coast of South America also is not known.

Key words : Sheep - Trypanosomosis - *Trypanosoma evansi* - *Trypanosoma vivax* - Epidemiology - Sera - Indirect immunofluorescence - Prevalence - Guyana.

VOKATY (S.), McPHERSON (V.O.M.), CAMUS (E.), APPLEWHAITE (L). Tripanosomosis ovina : estudio sero-epidemiológico en la zona costera de la Guyana. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 57-59

El objetivo del presente estudio fue la determinación de las tasas de seroprevalencia de *Trypanosoma vivax* y *Trypanosoma evansi* en ovejas, en la zona costera de la Guyana. Se tomaron muestras de sangre en un grupo de ciento noventa y tres (193) ovejas, escogidas al azar en veintidós (22) fincas de la región 5, Mahaica/Berbice, zona costera de la Guyana. Se recolectaron datos concernientes a la edad, raza, sexo y establecimiento de origen de las ovejas incluídas en el estudio. Ciento setenta y seis (176) muestras de suero fueron sometidas al test de Inmunofluorescencia Indirecta de Anticuerpos (IFA) para *T. vivax* y *T. evansi*. La fluorescencia se graduó en 0 (negativa), 1+ (muy leve), 2+ (leve), 3+ (fuerte) o 4+ (muy fuerte) y fue medida en diluciones de suero de 1:160. Las muestras fueron consideradas seropositivas cuando no se observó ninguna inmunofluorescencia. Los resultados de la Inmunofluorescencia Directa de Anticuerpos fueron obtenidos para ciento sesenta y un (161) muestras. Ciento tres (64%) sueros fueron positivos para *Trypanosoma* sp. De estos, 38 (23,6 %) se mostraron positivos para *T. evansi*, once (6,8 %) para *T. vivax* y solo 54 (33,5 %) para ambos. En vista de la existencia de reacciones cruzadas entre *T. vivax* y *T. evansi*, la determinación de las especies de exposición fue difícil en aquellos sueros con resultados positivos para ambas especies. La seroprevalencia general de 64 % sugiere que la tripanosomosis en ovejas es endémica en esta zona costera de Guyana. A pesar de que se presume que *T. vivax* es patógeno en la oveja, se desconoce aún la importancia clínica de *T. evansi*. De la misma manera, se ignora cual es el vector de ambas especies de tripanosomas en ovejas, en la costa norte de Sur América.

Palabras claves : Ovino - Tripanosomosis - *Trypanosoma evansi* - *Trypanosoma vivax* - Epidemiología - Suero - Inmunofluorescencia indirecta - Prevalencia - Guyana.